

Prevalence of Dequervain Tenosynovitis due to Excessive use of Smartphones among Students of Public Sector Institutes of Rawalpindi City

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Abstract

Objective: To investigate the prevalence of Dequervain Tenosynovitis due to Excessive use of Smartphones among Students of Public Sector Institutes of Rawalpindi City

Study design: It is a cross sectional study.

Place and duration of study: A four-month study was carried out in public sector Institutes of Rawalpindi city.

Material and Methods: The study was conducted from June 2023 to September 2023. Participants of age 15-30 years, both genders who were long term excessive smartphone users were included in study. Students with any fracture or deformity at wrist or hand and those who do not use gadgets were excluded from the study. Our Sample size was 346 students which were selected through non-probability convenient sampling. Data was collected through self-structured questionnaire which includes Finklestein test for physical examination, Numeric pain rating scale (NPRS) to assess intensity of pain and general questions to check functional status of individuals.

Results: The prevalence of DQT among smartphone users is 43.4% (150/346) positive and 56.6% (196/346) negative according to Finklestein test. Moreover, intensity of pain according to NPRS among 41% (142/346) participants were with no pain while according to our self-designed questionnaire with excellent functional status were 217 out of 346(62.7%).

Conclusion: The results concluded that partial participants (150/346) experienced DQT due to excessive phone use. Slight decrease in functional status of affected individuals was also observed.

Keywords: Dequervain tenosynovitis, Finklestein test, Numeric Pain rating scale, Abductor pollicis longus, Extensor pollicis brevis, smart phones

1. Introduction

Texting thumb is an ailment in which stenosis (Lee, Stranix et al. 2017) of thumb abductors surrounding the radial styloid process takes place (Ali, Asim et al. 2014, Taufiq, Batool et al. 2015). The condition affects the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons as they pass through a fibro-osseous tunnel in the hand, essential for moving the thumb away from the palm (radial abduction) (Taufiq, F., et al. 2015). Similar to trigger finger, this ailment involves non-inflammatory thickening of these tendons and the tunnel they pass through. The tendons are anchored against the radial styloid by the extensor retinaculum, forming the tunnel (Iqbal, S., et al. 2021) Thickening due to trauma restricts normal movement, leading to inflammation and further swelling. Inflammatory

cells are found within the tendon sheath upon microscopic examination (Janson Mak. 2018).

It prevails in 1.3% females and 0.5% males approximately. The peak prevalence tends to be among people in their forties and fifties, making it more prevalent within this age group (Satteson and Tannan 2022). Mothers and child care providers may face bilateral symptoms, but things tend to get better as they lift the child less frequently. Meanwhile, in industrial settings, about 8% of individual's experience wrist pain with a positive Finkelstein's test (Som, Wermuth et al. 2022).

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Understanding these factors can help us provide better care and support to those affected. (Ashurst, Turco et al. 2010, Satteson and Tannan 2022). The sign and symptoms associated with texting thumb include: Pain (Baabdullah, Bokhary et al. 2020, Zirek, Mustafaoglu et al. 2020), tenderness (Satteson and Tannan 2022), discomfort and edema around wrist 1st dorsal compartment (Lee, Stranix et al. 2017), stiffness of first extensor compartment tendons of hand (Ilyas, Ast et al. 2007, Turkay, Inci et al. 2017).

Women having a higher susceptibility of this condition, especially during and after pregnancy. Hormonal fluctuations and increased fluid retention during pregnancy may contribute towards the onset of De Quervain's tenosynovitis in women (Chaya, Bakhach et al. 2018).

The diagnosis of de Quervain's tenosynovitis is confirmed through the Finkelstein test, a clinical procedure where the therapist holds the patient's thumb and tilts the hand towards the ulnar direction. The other diagnostic test called Eichhoff's test, in which the therapist places the thumb inside the palm and curls the fingers around it. The therapist then gently moves the thumb in an ulnar direction (Mak 2018). Another diagnostic test for DQT is the Wrist Hyper flexion and Abduction of the Thumb (WHAT) test. During this test, the patient's wrist is hyper flexed, and the thumb is abducted while the therapist resists the movement. (Fakoya, Tarzian et al. 2023). Ultrasonography is an efficient diagnostic tool to diagnose DQT. (Ashurst, Turco et al. 2010). MRI is employed as a diagnostic tool for de Quervain tenosynovitis also. (Ashurst, Turco et al. 2010).

For the management of DQT conservative treatment include casts, splints (MAHDINASAB and ALEMOHAMMAD 2010) corticosteroid injections. (Mak 2018). Spica splint with therapeutic ultrasound is proven more effective conservative management (Awan, Babur et al. 2017) Corticosteroid injection along with orthotic devices is proved to be more efficient than corticosteroid injection alone (Cavaleri, Schabrun et al. 2016). Active assisted exercises with stretchings of the associated joints is performed. (Goel and Abzug 2015). MWM during lateral and medial glide of carpus are used for treatment of de Quervain's tenosynovitis.

In severe cases, surgical intervention is considered for de Quervain's tenosynovitis. One effective technique involves releasing the hand extensor compartment. (Bosman, Duraku et al. 2022). Also a minimally invasive approach involves ultrasound-guided partial release combined with a corticosteroid injection using a 21-gauge needle (Mak 2018)

The significance of our survey was to aware general population about the prevalence of DQT among students with excessive mobile usage. The students will get aware about the risk factors of excessive use of mobile and SMS texting. The previous studies conducted were not covering the twin cities literature. Our main focus is to check the occurrence of DQT among students of Rawalpindi physiotherapist of Pakistan will get aware and can widen their treatment approaches on students.

2. Materials & Methods

A descriptive cross sectional survey was done within a period of 4 months among the students of public sector Institutes of Rawalpindi city. Sample size was 346. Non probability convenience sampling was used. Our study included student age between 15-30 years. Smart phone using students were only included in the study. Students of both genders who were willing to complete the observation period were included. Students with any physical deformity of wrist and thumb were excluded. Students with wrist and thumb fractures and systemic disorders were not included. We used self-designed questionnaire. Finkelstein assessment test and NPRS (numeric pain rating scale) was used to assess pain. We seek permission from CASHT research committee. Consent form was signed from the research participants. After taking consent from the student's self-designed questionnaire, NPRS (numeric pain rating scale) was filled from students and Finkelstein test was applied on students to diagnose DQT. We used SPSS 21 version for analysis. For qualitative and quantitative variables and mean, frequency and percentages were taken. Frequency charts and plots were used for showing the results of variables.

3. Results

In this following study, the data was obtained from the undergraduate and college students of government colleges and universities of Rawalpindi, the sample size was 346 with mean and standard deviation (173.50±100.026). The students falling in the inclusion

criteria were only included in the study. The individuals aged between 15-30, male and female who were continuous long-term users of smart phone. The students falling in the exclusion criteria were already excluded from the study.

The results demonstrate that 151 students fall in 15-20 age group, 183 participants were falling in 21-25 age group, and 12 participants were in 26-30 age group.

The results show that out of 346 study participants 66 are male and 280 are female. Table 1 shows the frequencies of gender included in the study.

Table 1: Frequency of Gender distribution of study participants

Student gender	Frequency	Percent	Valid Percent	Cumulative Percent
male	66	19.1	19.1	19.1
female	280	80.9	80.9	100.0
Total	346	100.0	100.0	

The results obtained from the physical examination test performed on 346 participants shows that 196 participants are falling in negative criteria and 150 are falling in positive criteria.

Table 2: Frequency distribution of Finkelstein test

Finkelstein test	Frequency	Percent	Valid Percent	Cumulative Percent
negative	196	56.6	56.6	56.6
positive	150	43.4	43.4	100.0
Total	346	100.0	100.0	

The results gathered about the frequency of hours spent by students on mobile phone. From 346 total participants 49 were using less than 2 hours, 93 were using 2-4 hours, 82 were using 4-6 hours, 61 were using 6-8 hours and 61 were using smart phone more than 8 hours.

Table 3 below shows the frequency of pain experienced by the participants of the study. Among 346 total participants 142 experienced zero intensity pain, 47 experienced 1 intensity pain, 77 experienced 2 intensity pain, 12 experienced 3 intensity pain, 26 experienced 4 intensity pain, 13 experienced 5 intensity pain, 17 experienced 6 intensity pain, 2 experienced 7 intensity

pain, 9 experienced 8 intensity pain, 1 experienced 9 intensity pain.

Table 3: Frequency ranges of numeric pain rating scale

NPRS	Frequency	Percent	Valid Percent	Cumulative
0	142	41.0	41.0	41.0
1	47	13.6	13.6	54.6
2	77	22.3	22.3	76.9
3	12	3.5	3.5	80.3
4	26	7.5	7.5	87.9
5	13	3.8	3.8	91.6
6	17	4.9	4.9	96.5
7	2	.6	.6	97.1
8	9	2.6	2.6	99.7
9	1	.3	.3	100.0
Total	346	100.0	100.0	

Underlying table 4 shows the total score of the questionnaire and describe the results on the basis of type of functional status. Out of 346 sample size 217 were falling in excellent functional status category, 112 were falling in good functional status category and 17 were falling in fair functional status category.

Table 4: Frequency of total score

Total score	Frequency	Percent	Valid Percent	Cumulative Percent
excellent functional status (0-15)	217	62.7	62.7	62.7
good functional status (16-30)	112	32.4	32.4	95.1
fair functional status (31-45)	17	4.9	4.9	100.0
Total	346	100.0	100.0	

4. Discussion

The study conducted to find out the prevalence of Dequervain tenosynovitis due to excessive use of smart phones among students of government educational institutes in Rawalpindi city. The excessive use of smart phones among students is a common problem today which leads to wide variety of clinical conditions and diseases in which De Quervain's tenosynovitis is one disease of interest associated with excessive smart phone use. The main focus of our study is to assess the prevalence of de Quervain's tenosynovitis among students aged between 15-30 years with excessive smartphone use and to evaluate the functional status and intensity of pain at radial styloid process. The inclusion criteria of our study included students aged between 15-30years using smart phone excessively and both genders were included. We excluded individuals having fracture or wrist deformity and those who don't use smartphone.

Other researchers have conducted similar studies with comparable outcomes. For instance, Ahmed et al. (2019) conducted a cross-sectional study in Karachi, surveying individuals aged 15-35 to determine the prevalence of De Quervain's tenosynovitis associated with text

messaging. Their study involved 700 participants with diverse educational backgrounds. They utilized the Finkelstein test for diagnosis and analyzed the data using SPSS version 20. Their findings indicated a male-to-female ratio of 1:2. Likewise, in our study, the male-to-female ratio is slightly lower for males. Both studies observed a higher usage of touchscreen mobile phones, especially among individuals with excessive internet use. Additionally, a significant portion of the population utilized mobile phones for purposes beyond texting and gaming. In their study, 58.8% of the participants tested positive for the Finkelstein test. In comparison, our study found 150 out of 346 participants exhibiting positive Finkelstein test results. A positive Finkelstein test suggests the presence of De Quervain's tenosynovitis. These findings indicate a consistent trend in the development of this condition across different studies (Ahmed et al., 2019).

Another study, conducted by Sarfraz et al. in 2022, investigated the prevalence of De Quervain's tenosynovitis and its connection to mobile texting. Their research revealed a higher occurrence of De Quervain's tenosynovitis among students who excessively used mobile phones. Their cross-sectional study involved 191 participants and utilized the Numeric Pain Rating Scale and Finkelstein test for assessment, along with the standard Michigan Hand Outcomes Questionnaire. Data analysis was conducted using SPSS, and categorical variables were compared through chi-square tests. In contrast to our study, which focused on individuals aged 15 to 30 years, Sarfraz et al.'s study included participants aged between 22 and 32 years. Both male and female students were part of their study, with a slightly higher number of females compared to males, mirroring the gender ratio observed in our research. Their findings emphasized a positive correlation between the Finkelstein test and the Michigan Hand Outcomes Questionnaire, as well as the Numeric Pain Rating Scale and the Michigan Hand Questionnaire. Much like our study, their research highlighted that a significant portion of the younger population develops De Quervain's tenosynovitis due to excessive phone use, demonstrating a clear connection between texting on smart phones and pain around the radio-styloid process (Sarfraz et al., 2022).

A study conducted by Ayaz and group in 2022 highlights the prevalence of De Quervain tenosynovitis among

phone gamers, attributing it to repeated thumb movements and overuse of the wrist joint, intensifying the symptoms. The research employed a cross-sectional survey, utilizing a self-designed questionnaire and a reliable Finkelstein test. The study focused on young students in Multan, with data collected from 300 participants, both male and female, using purposive sampling techniques. Results indicated that 13% of gamers exhibited De Quervain tenosynovitis, which aligns with our findings where 150 out of 346 participants showed positive results for the Finkelstein test. The study observed a strong correlation between tenosynovitis and gaming hours, substantiated by a low p-value of 0.000. Furthermore, 87 students experienced stress during gaming, reporting difficulties in gripping objects, twisting keys, and typing on keyboards—paralleling our findings where 150 participants demonstrated similar symptoms. It's important to note that Ayaz et al.'s study specifically focused on young mobile gaming students in Multan, while our research encompassed smart phone users from Rawalpindi's government sector universities and colleges (Ayaz et al., 2022)

Our findings describes that excessive smart phone usage is linked with prevalence of DQT as 43.3% individuals are giving positive results on Finkelstein test. Our result suggests that there are weak findings in decreased functional status and occurrence of DQT as only 4.9% are falling in fair functional status criteria and 62.7% individuals are in excellent functional status category. Texting is not the only reason for the occurrence of DQT, as 32.1% individuals send 10-30 text messages per day while only 10.7% individuals send >200 text messages per day they may use mobile phone for gaming and other social networking that may lead to DQT. Participants scoring zero intensity pain criteria are 41% while those scoring 9 intensity pain are 3%. This shows that pain is not only a symptom of DQT.

Conclusion:

The primary objective of this study was to assess the prevalence of De Quervain's tenosynovitis among students using smart phones, along with evaluating their pain intensity and functional status. The results indicated that 43.3% participants experienced De Quervain's tenosynovitis due to excessive mobile phone usage. Additionally, a slight decrease in the functional status of

affected individuals was observed. The study concluded that these individuals experienced mild to moderate pain.

Limitations:

Our study is not generalized because of short duration and limited sample size. The vastness of our study results implication is limited because we included universities and colleges. Our study included students because they use smarter phone for academic and personal usage as compared to general public. Results of present research is based on 15-30 age group individuals; it cannot be applied to all age groups. This study may identify a link between mobile phone use and DQT but other factors such as genetics and ergonomics could contribute to the condition. A cross-sectional study design may not capture the temporal relationship while longitudinal studies would provide more insight. Students may have busy schedules making participation challenges, this could impact the sample size.

Recommendations:

Our recommendations for future researchers will be that they should include large sample size and increase time duration for more generalized results. This study was limited to Rawalpindi but efforts can be made to generalize the findings by including more areas all over the world. Future researchers could include private sector institutes also. Researchers could consider using longitudinal-study design for greater accuracy. Including general public could solve the problem of busy schedules of students.

Conflict of Interest:

The authors declare that there is no conflict of interest.

References:

1. Ahmed, N., et al. (2019). "Occurrence of De Quervain's Tenosynovitis and its association with Short Message Service Texting Habit: A cross-sectional Study in the General Population of Karachi, Pakistan." *International Archives of BioMedical And Clinical Research* 5(1): 7-11.
2. Ali, M., et al. (2014). "Frequency of De Quervain's tenosynovitis and its association with SMS texting." *Muscles, ligaments and tendons journal* 4(1): 74.